GAS ANALYZER CIRCUIT EMULATION IN TINKERCAD

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The project is designed to determine the level of gas contamination. The project specification is presented in the following table

Name	Quantity	Component
U1	1	Arduino Uno R3
Meter1	1	Voltage Multimeter multimeter(bb)
R1	1	4700 ohm Resistor
PIEZO2	1	Piezo
D1	1	LED RGB
R2 R4 R6 R3	4	220 ohm Resistor
GAS1	1	Gas Sensor
Rpot1	1	250 kOhm, Potentiometer
U2	1	LCD 16 x 2

The scheme is shown in figure 1.

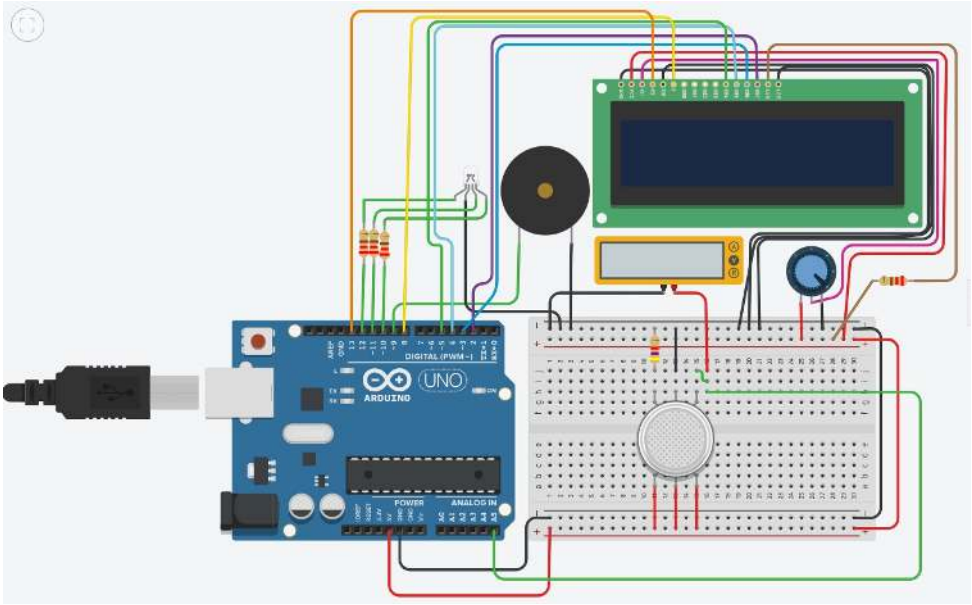

Figure 1. Determine the level of gas contamination scheme.

The level is measured by the Analog Gas Sensor in conventional units and is converted to the scale [1,100], using the map function.

valorSensor = map(valorSensor, 755, 306, 100, 1);

The Voltage Multimeter indicates the sensor output voltage and is not controlled by the microprocessor.

The level of gas contamination is conditionally divided into three zones:

1. **GREEN ZONE – no problem**.
2. **YELLOW ZONE – there is some trouble**.
3. **RED ZONE – danger!!!**

If the gas contamination is in the green zone (from 0 to 50), then the LED lights up green, and no sound is output (see figure 2).

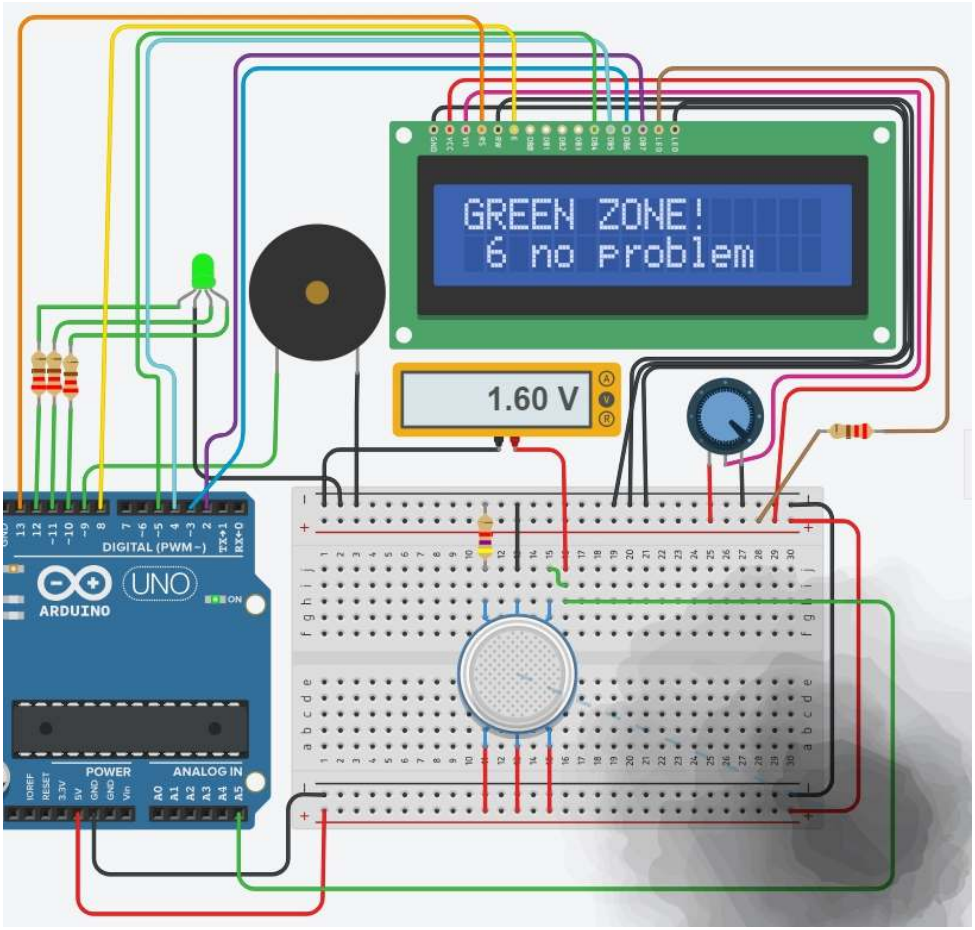

Figure 2. Gas contamination is in the green zone.

If the gas contamination is in the yellow zone (from 50 to 75), then the LED lights up yellow, and sound is output (see figure 3).

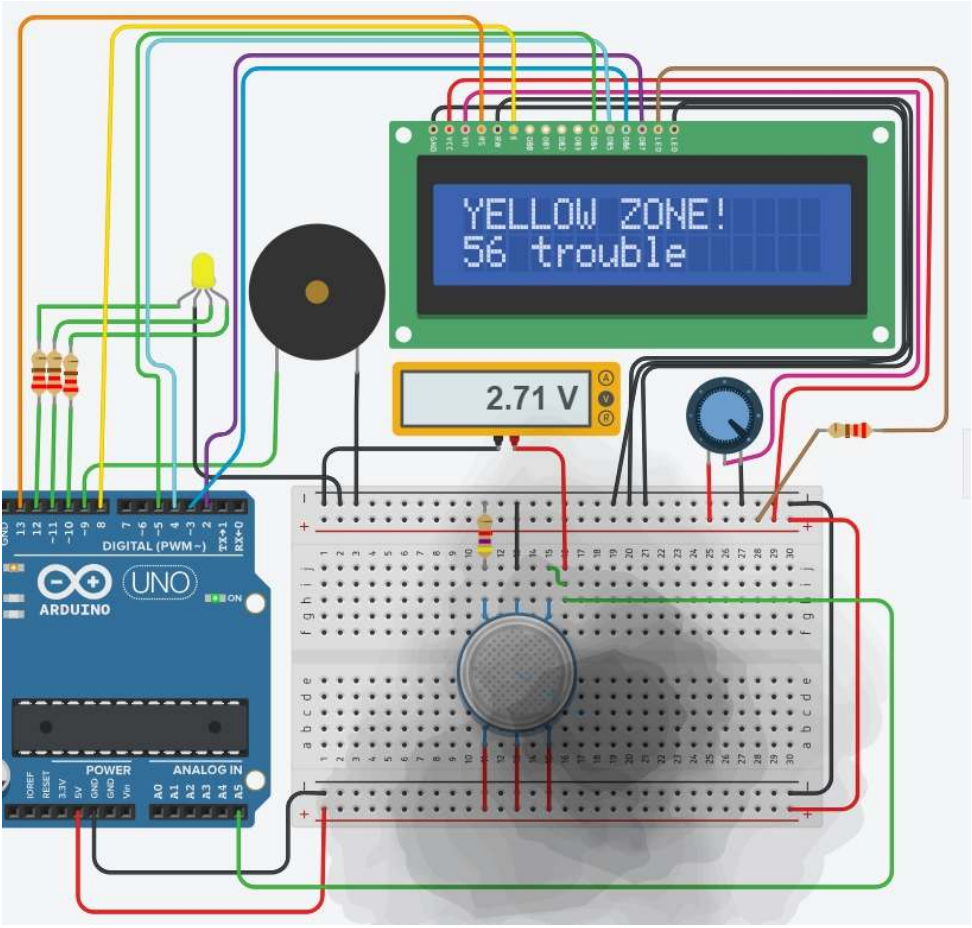

Figure 3. Gas contamination is in the yellow zone.

If the gas contamination is in the red zone (from 75 to 100), then the LED lights up red, the frequency of the sound signal increases (see figure 4).

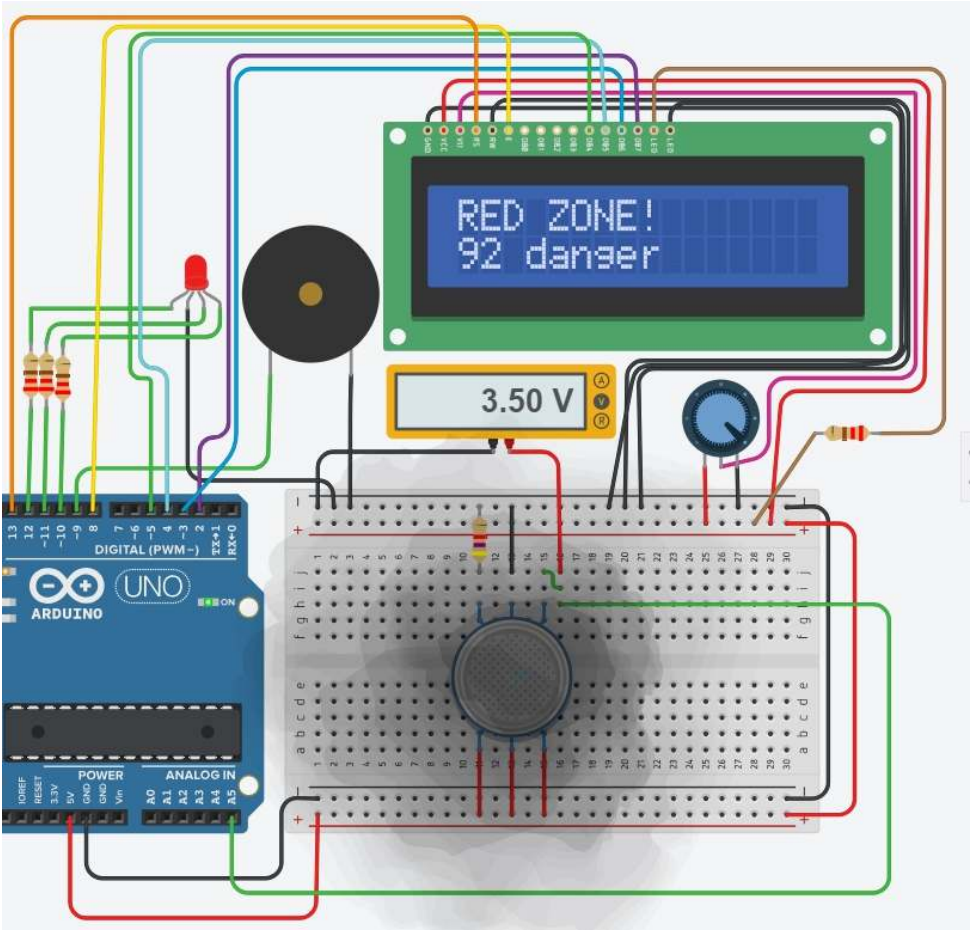

Figure 4. Gas contamination is in the red zone.

The Arduino microprocessor is programmed using the following code.

When creating the program code, the technology of writing small scripts “on the fly” was widely used [1-10].

```
// include the library code:
#include <LiquidCrystal.h>
// initialize the library with the numbers of the interface pins
LiquidCrystal lcd(13, 8, 5, 4, 3, 2);

#define GLED 10  // Green
#define BLED 11  // Blue
#define RLED 12  // Red

int entradaAnalogica = 5;
int valorSensor = 0;
char myStr[16];

void setup(){
// set up the LCD's number of columns and rows:
  lcd.begin(16, 2);
// Print a message to the LCD.
  lcd.print("GREEN ZONE!     ");
  lcd.setCursor(4, 1);
  lcd.print("   no problem   ");
  pinMode(A5, INPUT);
  pinMode(9, OUTPUT);
  pinMode (BLED, OUTPUT);
  pinMode (GLED, OUTPUT);
  pinMode (RLED, OUTPUT);
  Serial.begin(9600);
}

void loop(){
  valorSensor = analogRead(entradaAnalogica);
  valorSensor = map(valorSensor, 755, 306, 100, 1);
  Serial.println(valorSensor);
  if(valorSensor > 75){
    noTone(9);
    tone(9,500);
    digitalWrite(RLED, HIGH);
```

```
    digitalWrite(GLED, LOW);
    digitalWrite(BLED, LOW);
    lcd.setCursor(0, 0);
    lcd.print("RED ZONE!       ");
    lcd.setCursor(0, 1);
    lcd.print(valorSensor);
    lcd.setCursor(3, 1);
    lcd.print("danger       ");
    return;
  }
  if(valorSensor > 50){
    noTone(9);
    tone(9,150);
    digitalWrite(RLED, HIGH);
    digitalWrite(GLED, HIGH);
    digitalWrite(BLED, LOW);
    lcd.setCursor(0, 0);
    lcd.print("YELLOW ZONE!    ");
    lcd.setCursor(0, 1);
    lcd.print(valorSensor);
    lcd.setCursor(3, 1);
    lcd.print("trouble      ");
    return;
  }
  noTone(9);
  digitalWrite(RLED, LOW);
  digitalWrite(GLED, HIGH);
  digitalWrite(BLED, LOW);
  lcd.setCursor(0, 0);
  lcd.print("GREEN ZONE!     ");
  lcd.setCursor(0, 1);
  sprintf(myStr,"%2d",valorSensor);
  lcd.print(myStr);
  lcd.setCursor(3, 1);
  lcd.print("no problem   ");
}
```

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